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ABSTRACT

Although metamemory has recently received renewed interest by several investigators, individual differences in memory skills have received little if any attention. While individual differences in memory skills have common sense validity, these differences have been difficult to document experimentally. This study used a repeated measures design to correct for this problem. College students (N=158) completed Maiden's Metamemory Scale, a questionnaire which tests self-knowledge of preferred strategic encoding style. On the basis of their performance on this scale, 19 subjects were identified as verbalizers and 12 subjects were identified as imagers. These 31 subjects who showed a clear preference for either verbal or spatial encoding strategies were asked to remember two short stories using their preferred and non-preferred strategy. Both instructions and story order were randomly assigned. The results indicated that individual differences in encoding styles and metamemory for these encoding styles existed. Traditional models of memory were unable to adequately explain the findings. The findings suggest a multimodal model of memory in which intra-individual differences exist and support the possibility that individuals could be effectively trained in their superior memory mode. (Maiden's Metamemory Questionnaire is appended.) (NB)

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METAMEMORY AND INDIVIDUAL DIFFERENCES IN VERBAL AND SPATIAL RECALL

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Metamemory and Individual Differences in Verbal and Spatial Recall

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Although metamemory has recently received renewed interest by several investigators, individual differences in memory skills have received little if any attention. While individual differences in memory skills have common sense validity, these differences have been difficult to tease out experimentally. To correct for this a repeated measures design was used. Subjects were administered a metamemory questionnaire that tested self-knowledge of preferred strategic encoding style. Those scoring in the upper or lower quartile (i.e., those showing a clear preference for either verbal or spatial encoding strategy) were asked to remember two short stories using their preferred and non-preferred strategy. Both instructions and story order were randomly assigned. The results indicated that individual differences in encoding styles and metamemory for these encoding styles existed. Traditional models of memory were unable to adequately explain the findings.

Metamemory and Individual Differences in Verbal and Spatial Recall

Metamemory refers to the knowledge one possesses about functioning, development, and one's own memory in particular. (Flavell & Wellman, 1977). It has been operationalized in many ways (e.g. see Cavenaugh & Perlmutter, 1982, for a 100 year review). Yet, no other published research to the authors' knowledge has systematically examined individual differences in metamemory. The following research was an exploratory study which examined individual differences in metamemory operationalized as self-knowledge of preferred encoding style. The operationalization of metamemory in this way led to the design of a ten item metamemory questionnaire (Appendix I) which assessed individual differences across a verbal/spatial dimension.

Traditional theories of long term memory such as classical information processing models (e.g, Atkinson & Shiffrin, 1968) of the late 50's and early 60's were content blind. These theories conceived information was processed into the long term store identically regardless of the content that was processed or the individual who was doing the processing Alan Paivio (1971) was an exception to the content blind thesis. He proposed a dual model of memory. For example, he theorized that verbal events were processed differently and were held in a different mental store than spatial events. Paivio, however, ignored in general that individual differences may exist across the verbal/spatial dimensions. Indeed he argued that as a rule visual memory was superior to verbal memory with respect to recall of concrete events.

In contrast to Paivio's theory, the formost theoretical approaches of memory functioning during the 70's posited that the verbal or semantic system was the most important and efficient manner of representing material in deep cognitive structures for long-term recall. More recently, Shepard (1970, 1981, 1982) and Kosslyn (1986) have suggested that cognitive psychologists may have made a

serious error in positing a unitary mode of representation. They suggested that even though computers usually process information in one symbolic form that is no reason to believe that human beings do the same. They suggested that mental imagery exist as a separate modality. Foder (1983) suggest that the mind can be conceived of as a system where there are a number of separate information-processing devices, one for language, one for visual processing, one for music, etc. These specific processes or modules carry out specific tasks dependent upon the content or task demand. Gardner (1983) supports this view as he posited seven different modules that operate discreetely as a function of content.

We have extended this hypothesis and propose that memory is multi-modal and functions discreetely as a consequence both of the content and of the individual involved. In addition, we posit that individuals are cognizant of their preferred memory mode.

Thus, the purpose of this research was to test the following hypotheses:

(1.) These are qualitative individual differences in memory.

(2.) Individuals have accurate metamemory for their preferred encoding style.

(3.) Use of the preferred encoding style facilitates recall.

Subjects

158 volunteers (80 females; 78 males ranging in age from 18-21) participated in this study. They were recruited from the college student pool at Alfred University and Alfred State College located in upstate New York.

Procedure

All 158 subjects were assessed by the metamemory questionnaire. (See Appendix I for Maiden's Metamemory Scale.) On the basis of their performance on this scale, nineteen subjects were identified as verbalizers (i.e. scored 70% or higher on the metamemory scale for this preferred style) and twelve subjects were identified as imagers (i.e., scored 70%, as above, for the alternative preferred style). 70% was chosen as an arbitrary criterion score prior to the study to select subjects who clearly preferred one mode of memory processing over the other.

After the selection of subjects, they were randomly given verbal and imagery encoding instruction for the recall of two randomly presented short stories. The short stories and directions were given orally to the subjects. (See Table I for encoding instructions).

Insert Table I about here

The stories were selected because they have been reduced into separate memory units according to a method developed by Wechsler (1945). The experimenter was blind to strategic preference of all subjects. All of the subjects were audio-taped in their recall of the stories. A blind scorer listened to the tape recording of each subject. He or she scored the recalled items by counting the number of memory units recalled for each story, divided by the total units possible which yielded a percentage score. Thus, each subject was compared to himself as well as to others.

Results

A 2 X 2 repeated measure ANOVA wa performed. The analysis revealed a main effect for preferred mode F=12.84 (df 1.29), p .001). As predicted, this analysis revealed that subjects recalled significantly more information in their preferred than their non-preferred encoding strategy. (See Figure I) Mean percent of the content of stories recalled in perferred encoding strategy was 59.16% and 46.52% for nonpreferred encoding strategy. Of the verbalizers, 84% performed better in their preferred mode; of the imagers 92% performed better in their preferred mode. (See Table II)

Insert Table II and Figure I about here

T-Tests revealed superiority in the preferred mode at the p .001 level (1, 19) t=2.70 for verbalizers and p .005 (1, 11) t=2.40 for imagers.

Discussion

The purpose of this research was to examine individual difference in strategic metamemory. All hypotheses were supported in this study. Subjects, as predicted, were multimodal, aware of their dual skills and showed consistent preference in using one mode of memory functioning versus the other. Traditional memory theories (Atkinson & Shiffrin, 1971) are at a loss to explain these findings as their model focuses on the sequential nature of memory whereby encoding is conceived to be content-blind within a system that processes information through identical steps of symbolic representation. The results of the study, lends support to an encoding system that processes information in at least two symbolic forms as a function of the individual. Support for individual differences in memory comes from a recent study by Matsuoka (1986). His results suggest that there are good imagers and poor

imagers and that people are subjectively aware (have metamemory of) their ability or lack there of. Further support of this multimodel of memory comes from K. Warner Schaie's research with an aged population (1987) in which he and his colleagues reversed intellectual decline in elderly individuals by retraining them specifically in the memory mode (verbal or spatial) which had suffered declines.

This research is important for at least two reasons. First it suggests a multimodal model of memory in which intra-individual differences exist. Second, the research suggests the possibility that individuals could be effectively trained in their superior memory mode. This latter suggestion has practical benefits as individuals who are poor in one mode of memory processing could compensate for their deficit by being trained on a task in an alternative memory mode in which they function better (e.g., this memory strategy could apply to individuals who are learning disabled), or as Schaie (1987) has shown to elderly people who are experiencing memory deficits with aging.

Of course, at this point, this idea is fairly speculatory. This data represents only an initial exploration. Our study needs to be replicated across larger samples with several different types of memory scales to evidence a multimodal modal of memory functioning. We currently are in the process of extending and refining our research in metamemory and individual differences in memory functioning.

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Table I

Encoding Instructions

The following was presented orally to the subjects:

I am going to read you a story out loud. I want you to try and remember as much as you can because I am not going to repeat this story. After I am finished reading the story to you, I want you to tell me as much as you can remember. Please use this paper to draw or "doodle" notes on that will help you remember. Do not try to draw the entire story like a cartoon, i.e. word for word or picture for picture. You will not be allowed to use your "notes" when you repeat the story back to me. Are you sure you understand the instructions I just gave you? I will be taping your responses for accuracy. Are you ready? Here is the story.

Table II

Percent of Superior Recall by Subject in their Preferred Mode.

	% RECALLED IN PREFERRED MODE	% RECALLED IN NON-PREFERRED MODE
VERBALIZERS	84%	16%
IMAGERS	92%	98%

Maiden's Metamemory Questionnaire

SELF REPORT

1. When I have to remember how to get from A to B, I'd rather ____
   1) draw a map
   2) write down how to get there
   3) about the same

2. I would rather: ____
   1) draw
   2) do a word puzzle
   3) about the same

3. I read ____
   1) maps better than stories
   2) stories better than maps
   3) about the same

4. In describing a close relative, I'd rather: ____
   1) show a picture
   2) describe him/her verbally
   3) both, no preference

5. In explaining a new form to your boss/teacher I'd rather: ____
   1) draw it on a blackboard
   2) describe it accurately in verbal form
   3) both, no preference

OBJECTIVE

6. I have to go from here to your house. Explain to me in any manner you choose how to get there. ____
   1) spatial
   2) verbal
   3) combination spatial/verbal

7. I want you to remember all this information (showing them written & picture paragraph). How would you go about remembering it? ____
   1) spatial
   2) verbal
   3) both

8. How do you fix your car? ____
   1) drawings/diagrams
   2) written directions
   3) both

9. How would you explain these instructions? Hand them a recipe. ____
   1) draw it
   2) write it down
   3) both

10. Describe in any manner you choose, your home or dorm room ____
   1) spatial
   2) verbal
   3) both

% Content of the Story Recalled